Environmental radioactivity in the Faroes in 1970

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Environmental Radioactivity in the Faroes in 1970

by

A. Aarkrog and J. Lippert

The Danish Atomic Energy Commission
Research Establishment Risø
Health Physics Department

Abstract

Measurements of fall-out radioactivity in the Faroes in 1970 are presented. Sr-90 (and Cs-137 in most instances) was determined in regularly collected samples of precipitation, grass, milk, lamb, fish, sea water, bread, and drinking water. In addition, analyses of spot samples of potatoes, sea plants, birds. whale meat, vegetables, eggs, and human bone were carried out. Estimates of the mean contents of Sr-90 and Cs-137 in the human diet in the Faroes in 1970 are given.

CONTENTS

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Our special thanks are due to the staff of the pharmacy "Tjaldur" in Thorshavn and to all other persons in the Faroes who have contributed collecting samples.

ABBREVIATIONS AND UNITS

FP	fission products
pCi	picocurie, 10^{-12} Ci, $\mu\mu$Ci
nCi	nanocurie, 10^{-9} Ci, mμCi
mCi	millicurie, 10^{-3} Ci
MPC	maximum permissible concentration
S. U.	pCi Sr-90/g Ca
O. R.	Observed ratio
M. U.	pCi Cs-137/g K
n Sr	natural (stable) Sr
S. D.	standard deviation, $\sqrt{\frac{\Sigma(x-x_i)^2}{(n-1)}}$
S. E.	standard error, $\sqrt{\frac{\Sigma(x-x_i)^2}{n(n-1)}}$
S. S. D.	sum of squares of deviations, $\Sigma(x-x_1)^2$
f	degrees of freedom
s^2	variance
v^2	ratio between the variance in question and the residual variance
P	probability of the distribution in question
$\bar{x}$	mean values
Σ	sum
η	coefficient of variation

1. INTRODUCTION

1.1.

The fall-out programme for the Faroes, which was initiated in 1962[1] in close co-operation with the National Health Service and the chief physician of the Faroes, was continued in 1970. A few samples of human bone were obtained in 1970 from Dronning Alexandrines Hospital in Thorshavn. Sea water was sampled four times in 1970.

1.2.

The present report will not repeat information concerning sample collection and analysis already given in Risø Reports Nos. 64, 86, 108, 131, 155, 181[1], 202, and 221.

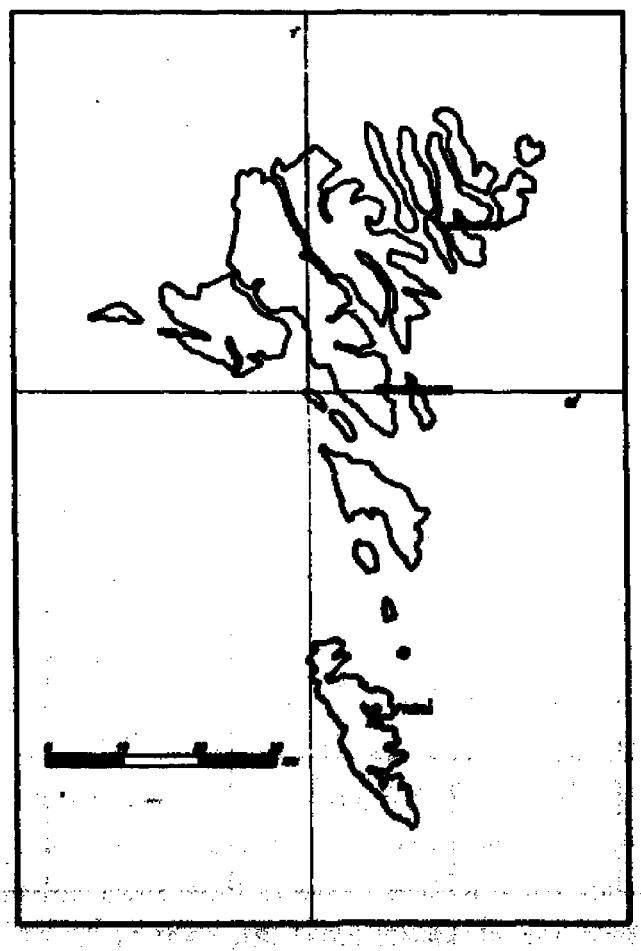

Fig. 2.1.1. The Faroes.

1.3.

The mean diet of the Faroese as used in this report is unchanged as compared with 1962, i.e., it is still based on the estimate given by Professor E. Hoff-Jørgensen, Ph.D., nutritional consultant to the Danish Atomic Energy Commission.

1.4.

The present investigation was carried out along with corresponding examinations of fall-out levels in Denmark and Greenland, described in Risø Reports Nos. 245[2] and 247[3] respectively.

2. RESULTS AND DISCUSSION

2.1. Sr-90 in Precipitation

Table 2.1 shows the Sr-90 content in precipitation collected at Høyvig (near Thorshavn) and Klaksvig in 1970. The amount of precipitation at

Table 2.1

Sr-90 in precipitation from the Faroes in 1970

Month	Høyvig		Klaksvig	
	pCi Sr-90/l	mCi Sr-90/km^2	pCi Sr-90/l	mCi Sr-90/km^2
Jan.	1.70	0.06	1.09	0.14
Feb.	0.86	0.05	0.69	0.16
Mar.	1.68	0.21	1.02	0.18
Apr.	3.22	0.16	5.65	1.23
May	2.40	0.12	2.67	0.13
June	2.38	0.13	3.23	0.15
July	2.58	0.21	4.55	1.06
Aug.	3.04	0.06	1.64	0.07
Sep.	0.94	0.14	0.78	0.21
Oct.	(0.8)	(0.2)	(0.7)	(0.2)
Nov.	0.67	0.07	0.61	0.16
Dec.	0.52	0.05	0.65	0.09
1970	x̄ 1.38	Σ mm 1048 1.45	x̄ ~ 2.2	Σ mm ~1750 ~3.8

The samples from October were missing. Hence the levels of this month were estimated from information on the amount of precipitation at Høyvig and from the Sr-90 levels measured in the months before and after October.

Table 2.2

Sr-90 and Cs-137 in grass from Thorshavn 1970

Month	pCi Sr-90/g ash	pCi Sr-90/kg	pCi Sr-90/g Ca	pCi Cs-137/kg	pCi Cs-137/g K	Cs-137/Sr-90
June	21	275	540	900	140	3.3
Aug.	24	480	560	1600	460	3.3

Klaksvig was a factor of 1.7 greater than that found at Høyvig, and the amount of fall-out at Klaksvig was 2.6 times that measured at Høyvig.

The mean specific activity of Sr-90 in precipitation in 1970 was approx. 40% higher than the 1969 level in the Faroes and the mean fall-out was nearly 80% higher.

2.2. Sr-90 and Cs-137 in Grass

Grass samples were collected near Thorshavn in 1970 as in the previous years. Table 2.2 shows the results. The mean S.U. content of the grass during the summer months was estimated at 550 S.U., and the mean S.U. in milk during June-September was 39 S.U. at Thorshavn (cf. 2.3), i.e. the observed ratio between S.U. in milk and in grass was 0.07 (0.10 in 1969, 0.09 in 1968 and 1967, 0.07 in 1966, and 0.14 in 1965). The 1970 S.U. levels in grass were 30% higher than the 1969 levels. As compared with Danish grass in 1970[2], we found the S.U. levels in the Faroese grass to be higher by a factor of approx. 7 in the summer months. The mean content of Cs-137 during the summer months was 1.3 nCi Cs-137/kg or 300 M.U., i.e. 3-4 times the 1969 levels.

The mean ratio between Cs-137 and Sr-90 in the grass (pCi/kg) was 3.3 in 1970, the ratio was 1.9 in 1969, 1.4 in 1968, 1.9 in 1967, 2.0 in 1966, and 1.8 in 1965.

2.3. Sr-90 and Cs-137 in Milk

As in the previous years[1], fresh milk samples collected weekly were obtained from Thorshavn, Klaksvig and Tværå. Sr-90 and Cs-137 were determined in bulked monthly samples.

Table 2.3.1 shows the results and tables 2.3.3 and 2.3.4 the analysis of variance of the S.U., M.U. and pCi Cs-137/l figures respectively. The variation between months was probably significant for Cs-137 and significant for Sr-90. As also observed in previous years, the variation between locations was significant for Cs-137, but not significant for Sr-90. The highest Cs-137 levels were found in the milk from Klaksvig and Tværå and the lowest in the Thorshavn milk.

Table 2.3.1

Sr-90 and Cs-137 in milk from the Faroes in 1970

	Thorshavn			Klaksvig			Tvøroyri			Mean		
Month	S.U.	pCi Cs-137/l	M.U.	S.U.	pCi Cs-137/l	M.U.	S.U.	pCi Cs-137/l	M.U.	S.U.	pCi Cs-137/l	M.U.
Jan.	33±3	310	204	36±2	310	199	36±0	410	277	35	343	227
Feb.	34±4	320	200	37±1	357	229	34±7	442	251	35	373	227
Mar.	30±1	365	240	34±6	334	226	38±4	338	192	34	346	219
Apr.	30±3	173	108	33±7	255	168	43±3	505	324	35	311	200
May	±2	250	160	37±7	534	342	39	471	310	37	418	271
June	50±12	320	195	55±5	388	255	38±3	839	567	47	516	339
July	45±5	374	225	44±7	379	256	45±1	444	492	45	399	324
Aug.	28	418	26	36	220	139	28	520	342	31	385	247
Sept.	31	175	115	33	161	102	31	322	204	32	219	140
Oct.	30	144	91	35	169	111	33	398	249	33	237	150
Nov.	31	243	152	41	461	292	38	593	375	37	432	273
Dec.	30	131	84	34	368	230	23	429	275	29	309	196
Mean	34	269	169	38	328	212	36	475	304	36	357	228

Table 2.3.2

Analysis of variance of ln pCi Sr-90/g Ca in milk 1970
(from table 2.3.1)

Variation	SSD	f	s^2	v^2	P
Betw. locations	0.0848	2	0.0424	2.10	-
Betw. months	0.9946	11	0.0904	4.48	>99.5%
Loc. x months	0.4434	22	0.0202	0.59	-
Remainder	0.6521	19	0.0343		
η = 0.19					

Table 2.3.3

Analysis of variance of ln pCi Cs-137/g K in Faroese milk in 1970
(from table 2.3.1)

Variation	SSD	f	s^2	v^2	P
Betw. locations	2.6504	2	1.3252	15.01	>99.9%
Betw. months	2.5834	11	0.2349	2.66	>97.5%
Remainder	1.9436	22	0.0883		
η = 0.30					

Table 2.3.4

Analysis of variance of ln pCi Cs-137/l milk in 1970
(from table 2.3.1)

Variation	SSD	f	s^2	v^2	P
Betw. locations	2.6771	2	1.3386	16.18	>99.95%
Betw. months	2.4328	11	0.2212	2.67	>97.5%
Remainder		22	0.0827		
η = 0.29					

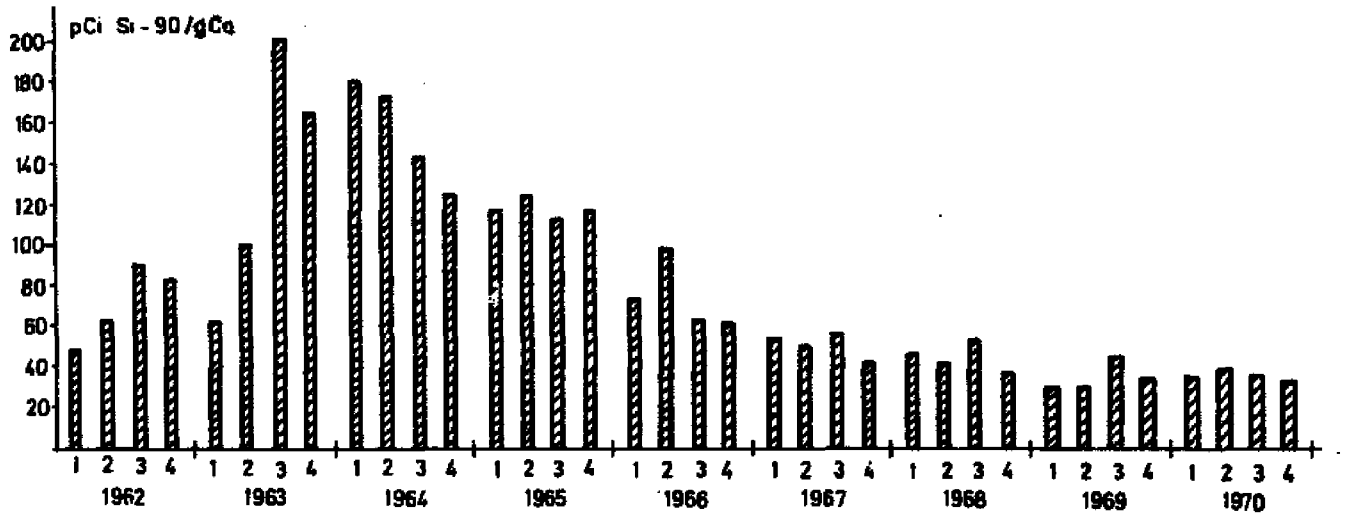

Fig. 2.3.1. Sr-90 in Faroese milk, 1962-70

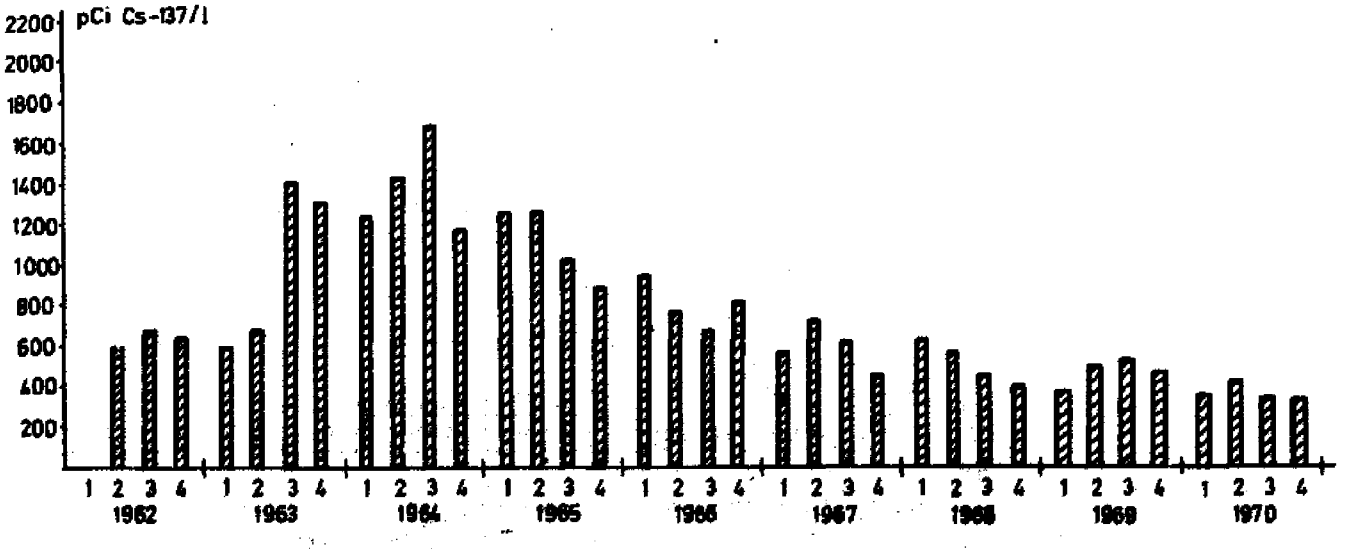

Fig. 2.3.2. Cs-137 in Faroese milk, 1962-70

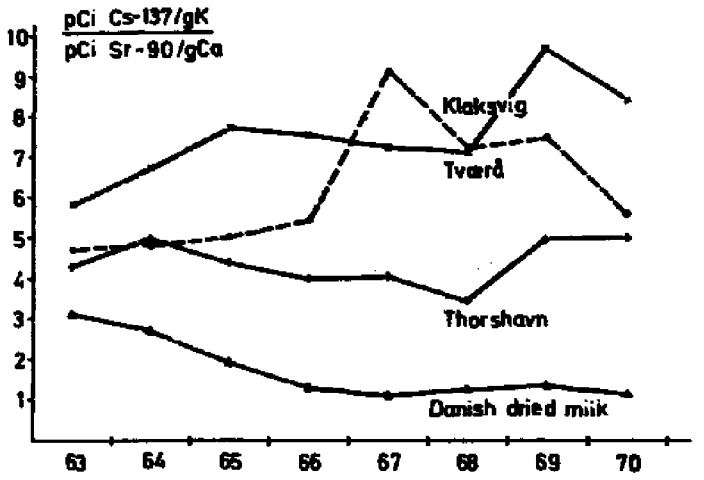

Fig. 2.3.3. $\frac{\text{M.U.}}{\text{S.U.}}$ ratios in Faroese and Danish milk, 1963-70

Fig. 2.3.1 shows the quarterly S.U. values and fig. 2.3.2 the quarterly pCi Cs-137/l levels since 1962. The annual mean values for 1969 were 36 S.U. (~43 pCi Sr-90/l) and 228 M.U. or 357 pCi Cs-137/l, i.e. the 1970 Sr-90 level was equal to,and the Cs-137 level approx. 80% of, the 1969 mean levels. (The predicted levels in Faroese milk from 1970 were 45 S.U. and 289 M.U.[6], i.e. 25% higher than those observed and probably an indication of a reduction with time in the availability of the Sr-90 and Cs-137 deposited in the soil).

The annual mean values of the M.U./S.U. ratio in Faroese milk are shown in fig. 2.3.3.

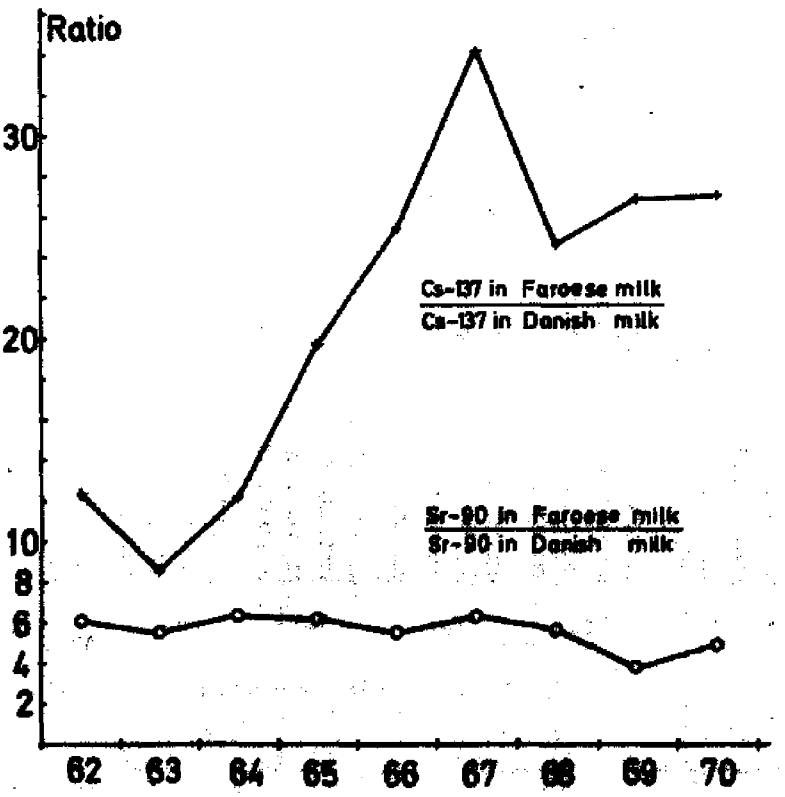

Fig. 2.3.4. A comparison between Faroese and Danish milk levels, 1962-70.

The mean ratio in 1970 was 6.5 during the grazing period (May-October), and in the winter time it was 6.5 i.e. unchanged. This is in agreement with the observations in 1966, 1967, and 1968[1].

Fig. 2.3.4 shows a comparison between the Sr-90 and Cs-137 levels in Faroese- and Danish-produced milk. It is evident that the soil uptake plays an important role in the Faroes, especially for the Cs-137 levels.

2.4. Sr-90 and Cs-137 in Terrestrial Animals

Lamb's meat was collected in March, June and August, 1970.

The mean levels were 190 pCi Sr-90/kg or 276 S.U. and 3.2 nCi Cs-137/kg or 995 M.U. The mean bone level was 153 pCi Sr-90/g Ca.

Table 2.4

Sr-90 and Cs-137 in sheep samples from the Faroes 1970

Sampling Month	Sample type		pCi Sr-90/kg	pCi Sr-90/g Ca	pCi Cs-137/kg	pCi Cs-137/gK
Mar.	Dried	Meat	174	335	2070	1260
Mar.		Bone	-	42	-	-
June	Dried	Meat	96	284	3340	675
June		Bone	-	44	-	-
Aug.	Fresh	Meat	300	210	4210	1050
Aug.		Bone	-	372	-	-

2.5. Sr-90 and Cs-137 in Sea Animals

Table 2.5.1 shows the Sr-90 and Cs-137 levels in fish and sea birds collected in 1970 in the Faroes. The mean levels in fish were 0.42 pCi Sr-90/kg (S.E.:0.06) and 13 pCi Cs-137/kg (S.E.: 3). The mean levels in sea birds were 1.5 pCi Sr-90/kg (S.E.: 1.0) and 15 pCi Cs-137/kg (S.E.: 7). The Cs-137 level in the pilot whale from August was remarkably high.

2.6. Sr-90 in Drinking Water and Fresh Water

Drinking-water samples were collected as previously[1]. Table 2.6.1 shows the results and table 2.6.2 the analysis of variance. As in the previous years the drinking water from Thorshavn contained more Sr-90 than that from Tvøre (cf. the explanation in Risø Report No. 181[1]).

Table 2.5.1

Sr-90 and Cs-137 in sea animals from the Faroes in 1970

Sampling Months		Species	Sample type	pCi Sr-90/kg	pCi Sr-90/g Ca	pCi Cs-137/kg	pCi Cs-137/g K
Jan.	Fish	Gadus aeglefinus	Meat	0.39	3.3	10	2.9
Jan.	"	Gadus callarias	Meat	0.54	3.4	20	5.4
Mar.	"	Gadus aeglefinus	Meat	0.19	2.9	9	4.6
Mar.	"	Gadus callarias	Meat	0.34	3.6	8	3.6
June	"	Gadus aeglefinus	Meat	0.71	7.6	25	7.1
Jun.	"	Gadus callarias	Meat	0.45	10	18	5.9
Nov.	"	Gadus aeglefinus	Meat	0.67	9.3	5	2.0
Nov.	"	Gadus callarias	Meat	0.30	2.1	6	3.0
Mean	"	Gadus aeglefinus	Meat	0.49	5.8	12	4.2
	"	Gadus callarias	Meat	0.36	4.8	13	4.5
June	Bird	Fratercula arctica	Meat	0.22	0.78	28	15.8
June	"	Fratercula arctica	Bone	-	0.25	-	-
Aug.	"	Fulmarus glacialis	Meat	0.67	19	6	1.7
Aug.	"	Fulmarus glacialis	Meat	3.57	6.3	10	7.1
Aug.	"	Fulmarus glacialis	Bone	-	0.17	-	-
June	Whale	Globicephalus melas	Meat	0.51	6.5	8	3.2
Aug.	"	Globicephalus melas	Meat	10.7	31	1700	290
Aug.	"	Globicephalus melas	Bone	-	0.16	-	-

Table 2.6.1

Sr-90 in drinking water from the Faroes in 1970

pCi Sr-90/l

Month	Thorshavn	Klakavig	Tvørå
Jan.	0.21	0.69	0.23
Mar.	0.35	0.76	0.33
May	0.21	0.75	0.19
July	0.98	0.14	0.40
Sep.	0.38	0.16	0.21
Nov.	0.33	0.14	0.23
1970	0.41	0.49	0.27

Table 2.6.2

Analysis of variance of the results in table 2.6.1

Variation	SSD	f	s^2	v^2	P
Betw. locations	0.2731	2	0.1366	0.27	-
Betw. months	1.1236	5	0.2247	0.45	-
Remainder	4.9830	10	0.4983		

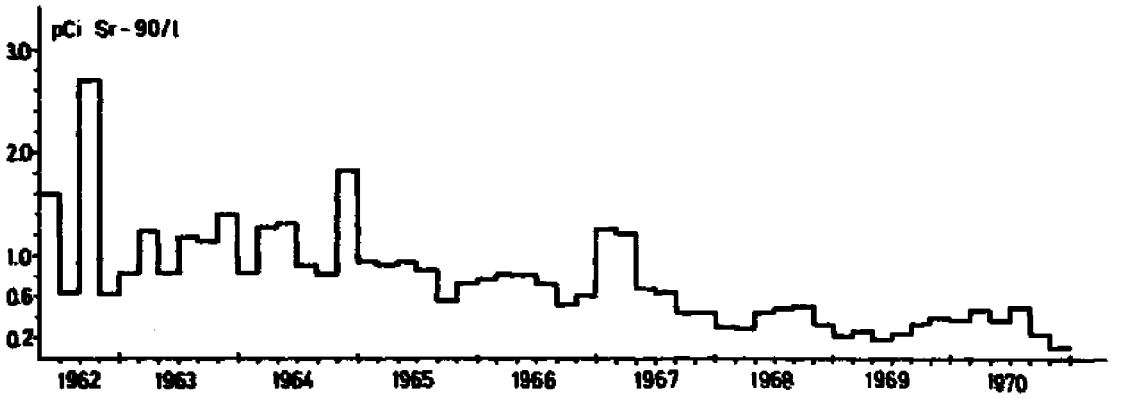

Fig. 2.6.1. Sr-90 in drinking water, 1962-70 (mean of Thorshavn, Klaksvig and Tvørå)

Fig. 2.6.1 shows the two-monthly mean levels of Sr-90 in drinking water from the three locations since 1962.

The mean level in 1970 was 0.37 pCi Sr-90/l, i.e. 1.3 times the 1969 level.

2.7. Sr-90 and Cs-137 in Miscellaneous Samples

2.7.1. Soil

No soil samples were collected in 1970 from the Faroes. From earlier years' observations we estimate the accumulated fall-out at Thorshavn at 67 mCi Sr-90/km^2 and that at Klaksvig at 136 mCi Sr-90/km^2.

2.7.2. Sea Water

Surface sea water was collected near Thorshavn four times in 1970. The Sr-90 mean level was 0.11 pCi Sr-90/l.

Fig. 2.7.2 shows the Sr-90 levels since 1962.

2.7.3. Sea Plants

Sea plants (Laminaria) collected in Maj, June, and August contained 3.8, 4.3 and 4.0 S.U., respectively and the June sample showed a M.U. level of 4.4 pCi Cs-137/g K.

Table 2.7.2

Strontium-90 in sea water collected at Thorshavn in 1970

Sampling month	pCi Sr-90/l	Salinity in o/oo
Mar.	0.14	32.8
July	0.094	32.8
Aug.	0.10	32.3
Nov.	0.090	33.7

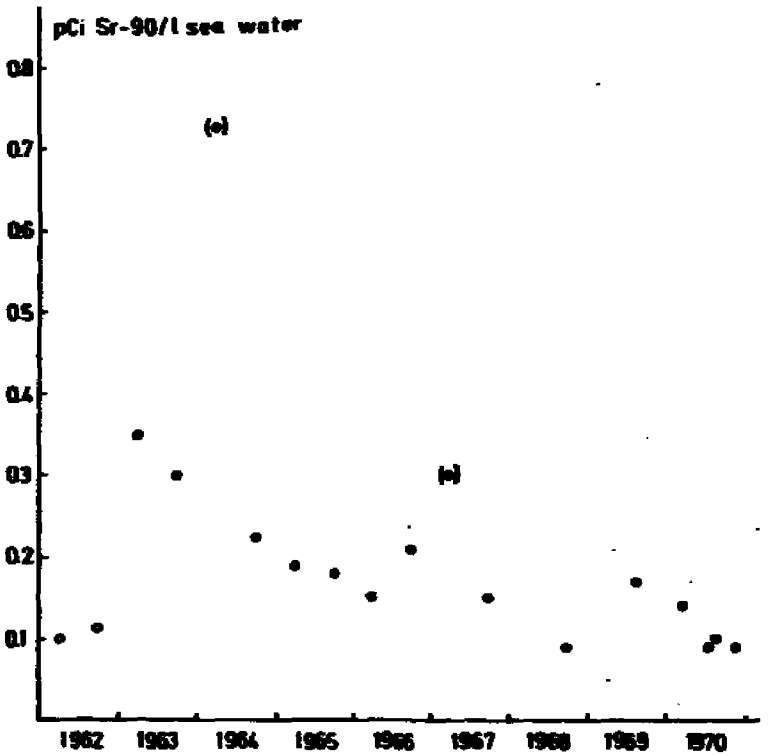

Fig. 2.7.2. Sr-90 in Faroese sea water, 1962-70

Table 2.7.4

Sr 90 and Cs-137 in potatoes and other vegetables from the Faroes in 1970

Sampling month	Species	pCi Sr-90/kg	pCi Sr-90/g Ca	pCi Cs-137/kg	pCi Cs-137/g K
Jan.	Beets	43	160	33	16
Nov.	Beets	51	150	50	14
Aug.	Red currants	36	66	74	21
Aug.	Carrots	17	63	2.6	2.2
Aug.	Cauliflower	2.2	19	11	2.5
Nov.	Potatoes	8.1	490	310	87

The high Sr-90 levels in two of the samples were probably due to the fact that these samples had not been collected directly from the sea, but on the shore, where rainwater might have contaminated them with Sr-90.

2.7.4. Potatoes and Other Vegetables

Table 2.7.4 shows the results of the Sr-90 and Cs-137 determinations.

The Sr-90 level in potatoes was 8.1 pCi/kg, i.e. a little lower than in 1969. The Cs-137 mean level was 310 pCi Cs-137/kg, i.e. somewhat lower than the 1969 level.

The Sr-90 and Cs-137 levels in carrots collected in 1970 were nearly equal to the levels found in Denmark[2].

2.7.5. Bread

As in the previous years[1], rye bread and white bread were collected in Thorshavn in June and December. The mean levels in white bread were 5.2 pCi Sr-90/kg and 14.5 pCi Cs-137/kg, i.e. higher than the 1969 levels. The rye bread collected in 1970 contained on the average 17 pCi Sr-90/kg and 29 pCi Cs-137/kg, i.e. the Cs-137 contents were approx. three times the 1969 levels, while the Sr-90 level was nearly equal to that of 1969. The Faroese rye bread levels were significantly lower than the Danish[2], but the white bread levels were nearly the same.

Table 2.7.5

Sr-90 and Cs-137 in Faroese bread in 1970

Month	Sort	pCi Sr-90/kg	pCi Sr-90/g Ca	pCi Cs-137/kg	pCi Cs-137/g K
June	White bread	4.67	6.7	16	14
June	Rye bread	17.3	21	27	13
Dec.	White bread	5.77	7.8	13	12
Dec.	Rye bread	17.5	11.3	31	15

Table 2.7.6

Sr-90 and Cs-137 in Faroese vegetables in 1970

Month	pCi Sr-90/kg	pCi Sr-90/g Ca	pCi Cs-137/kg	pCi Cs-137/g K
June	9.9	4.8	11	8
Dec.	0.42	2.7	0	0

2.7.6. Eggs

Eggs were collected from Thorshavn in June and December 1970. Table 2.7.6 shows the results.

2.8. Humans

In 1970 a number of human vertebrae samples were obtained from Dronning Alexandrines Hospital in Thorshavn. Table 2.8 shows the results. As compared with Danish bone levels in 1970[2] the Faroese levels in adults were 1.3 times as hign,and this is a lower ratio than found in 1969.

Table 2.8

Sr-90 in human vertebrae collected in the Faroes in 1970

Age	Month of death	Sex	pCi Sr-90/g Ca	Sample No.
74 years	5	m	1.14	MK 67
70 years	5	f	2.11	MK 68
57 years	5	f	1.79	MK 69
82 years	5	m	1.18	MK 70

3. ESTIMATE OF THE MEAN CONTENTS OF Sr-90 AND Cs-137 IN THE HUMAN DIET

3.1. Annual Quantities

As in 1962[1], the annual quantities are based on the estimate made by Professor E. Hoff-Jørgensen, Ph.D., on the assumption of a daily per capita intake of approx. 3000 calories.

3.2. Milk and Cream

75% of the milk consumed in the Faroes is assumed to be of local origin, and 25% comes from Denmark. Hence the Sr-90 content in milk consumed in the Faroes in 1970 was $1.2 \cdot (0.75 \cdot 36 + 0.25 \cdot 7.3) =$ 35 pCi Sr-90/kg, and the Cs-137 content was $0.75 \cdot 357 + 0.25 \cdot 14 =$ 271 pCi Cs-137/kg (cf. 2.3 and ref. 2). 1 kg milk contains 1.2 g Ca.

3.3. Cheese

Nearly all cheese consumed in the Faroes is of Danish origin, and the Danish figures from ref. 2 were used: 62 pCi Sr-90/kg and 10 pCi Cs-137/kg.

3.4 Grain Products

As most grain products are imported from Denmark, the Danish figures for 1970[2)] were used in the calculation of the Faroese levels. The mean daily consumption of grain products in the Faroes is, as in Denmark, 80 g rye flour, 120 g wheat flour and 20 g grits. Hence the mean concentration of Sr-90 in grain products consumed in the Faroes in 1970 becomes 18 pCi Sr-90/kg and 38 pCi Cs-137/kg. We realize (cf. 2.7.5) that these activity figures may overestimate the actual intake of Sr-90 from grain products in the Faroes.

3.5. Potatoes

All potatoes consumed in the Faroes are assumed to be of local origin. The values obtained from table 2.7.4 were used, i.e. 8.1 pCi Sr-90/kg and 310 pCi Cs-137/kg.

3.6. Other Vegetables and Fruit

As the amount of vegetables and fruit grown in the Faroes is limited, the Danish figures from 1970[2)] were used. Thus the mean contents in vegetables other than potatoes were 10 pCi Sr-90/kg and 5 pCi Cs-137/kg, and the mean contents in fruit were 3 pCi Sr-90/kg and 9 pCi Cs-137/kg.

3.7. Meat and Eggs

The meat and egg consumption in the Faroes is estimated to consist of 50% locally produced mutton (or lamb's meat), 25% local whale meat and 25% sea birds and eggs.

The mutton contained 190 pCi Sr-90/kg and 3.2 nCi Cs-137/kg (cf. 2.4). Whale meat contained 5.5 pCi Sr-90/kg and 850 pCi Cs-137/kg, sea birds and eggs (cf. 2.5 and 2.7.6): 3.3 pCi Sr-90/kg and 10 pCi Cs-137/kg.

Hence we estimate the mean content of Sr-90 in meat and eggs consumed in 1970 to be

$$0.50 \cdot 190 + 0.25 \cdot 5.5 + 0.25 \cdot 3.2 = 97 \text{ pCi Sr-90/kg}$$

and the Cs-137 content to be

$$0.50 \cdot 3.2 + 0.25 \cdot 0.85 + 0.25 \cdot 0.01 = 1.8 \text{ nCi Cs-137/kg.}$$

3.8. Fish

All fish consumed in the Faroes is of local origin, and the mean contents in fish, obtained from subsection 2.5, were 0.42 pCi Sr-90/kg and 13 pCi Cs-137/kg.

3.9. Coffee and Tea

The Danish figures for 1970[2] were used, i.e. 27 pCi Sr-90/kg and 168 pCi Cs-137/kg.

3.10. Drinking Water

The mean value found in table 2.6 was used, i.e. 0.37 pCi Sr-90/l. The Cs-137 content was estimated to be approx. one fourth (the ratio found in New York tap water in 1964[4]) of the Sr-90 content, i.e. 0.1 pCi Cs-137/l.

Tables 3.1 and 3.2 show the estimates of Sr-90 and Cs-137 respectively.

Table 3.1

Estimate of the mean content of Sr-90 in the human diet in the Faroes in 1970

Type of food	Annual quantity in kg	pCi Sr-90 per kg	Total pCi Sr-90	Percentage of total Sr-90 in food
Milk and cream	146	35	5110	42.5
Cheese	7.3	62	453	3.8
Grain products	80	18	1440	12.0
Potatoes	91	8.1	737	6.1
Vegetables	20	10	200	1.7
Fruit	18	3	54	0.4
Meat and eggs	37	97	3589	29.9
Fish	91	0.42	38	0.3
Coffee and tea	7.3	27	197	1.6
Drinking water	548	0.37	203	1.7
Total			12021	

The mean annual calcium intake is estimated to be 600 g (approx. 200-250 g of creta praeparata). Hence the pCi Sr-90/g Ca ratio in the total Faroes diet was 20 S.U., and the mean daily intake was 33 pCi Sr-90/day.

3.11. Discussion

Fig. 3 shows the Faroese diet levels since 1962.

The 1970 levels in total diet were nearly equal to the 1969 levels.

The main contributors of the Sr-90 content in the Faroese diet were milk products, meat and cereals, which together accounted for 85% - the same figure as in 1969 - of the total Sr-90 content in the diet in 1970. As regards Cs-137, milk products, meat (lamb), and potatoes were the most important contributors. In 1970, approx. 95% of the total Cs-137 content in the diet came from these products.

The Faroese mean diet contained nearly two times as much Sr-90 and more than ten times as much Cs-137 as the Danish 1970 diet[2].

Table 3.2

Estimate of the mean content of Cs-137 in the human diet in the Faroes in 1970

Type of food	Annual quantity in kg	pCi Cs-137 per kg	Total pCi Cs-137	Percentage of total Cs-137 in food
Milk and cream	146	271	39566	28.2
Cheese	7.3	10	73	0.1
Grain products	80	38	3040	2.2
Potatoes	91	310	28210	20.1
Vegetables	20	5	100	0.1
Fruit	18	9	162	0.1
Meat and eggs	37	1800	66600	47.5
Fish	91	13	1183	0.8
Coffee and tea	7.3	168	1226	0.9
Drinking water	548	0.1	55	0
Total			140215	

The mean annual intake of potassium is estimated to be approx. 1200 g. Hence the pCi Cs-137/g K ratio becomes 117 M. U. and the daily intake of Cs-137 384 pCi.

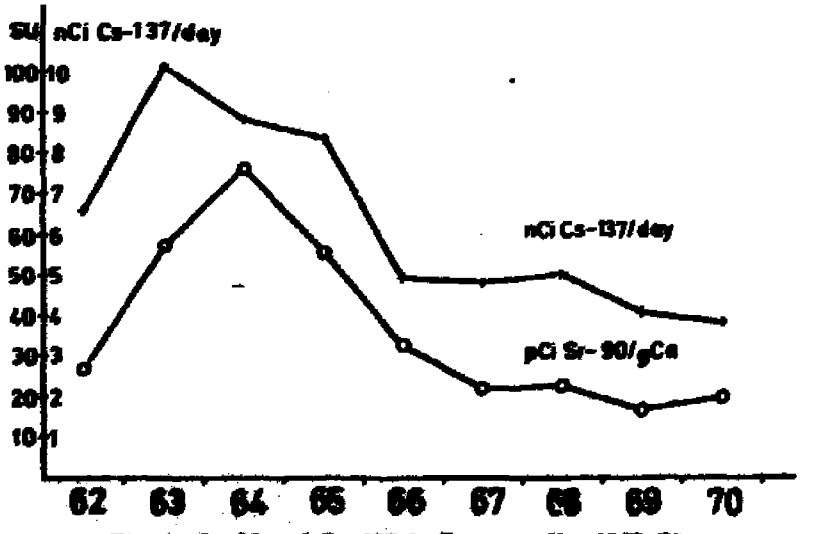

Fig. 3. Sr-90 and Cs-137 in Faroese diet 1962-70

4. CONCLUSION

4.1.

The Sr-90 fall-out rate in the Faroes in 1970 was approx. 2.6 mCi Sr-90/km^2. The accumulated fall-out by the end of 1970 was estimated at approx. 102 mCi Sr-90/km^2 (the mean of Thorshavn and Klaksvig).

4.2.

The mean level of Sr-90 in Faroese milk was 36 S.U. or 43 pCi Sr-90/l. The Cs-137 concentration was 228 pCi Cs-137/g K, or 357 pCi Cs-137/l.

Potatoes contained 8.1 pCi Sr-90/kg and 310 pCi Cs-137/kg. Lamb contained 190 pCi Sr-90/kg and 3.2 nCi Cs-137/kg. Fish showed mean levels of 0.4 pCi Sr-90/kg and 13 pCi Cs-137/kg.

The mean content of Sr-90 in drinking water was 0.37 pCi/l.

The mean daily per capita intakes with the diet in the Faroes in 1970 were estimated at 33 pCi Sr-90 (20 S.U.) and 384 pCi Cs-137 (117 pCi Cs-137/g K), i.e. nearly equal to the 1969 levels.

4.3.

From the Faroese and Danish diet estimates and from measurements on deciduous teeth[5] and Faroese and Danish bones, the Faroese bone levels in 1970 were estimated as follows: in new-born children: approx. 3 S.U.; in infants (1 month - 4 years): approx. 9 S.U. (depending upon the amount of locally produced milk in the diet of the infants); in children and teen-ages (5 - 19 years) : approx. 6 S.U.; in adult vertebrae: approx. 2 S.U.

The mean content of Cs-137 in the Faroese adult was estimated at approx. 35 nCi or approx. 300 pCi Cs-137/g K. This estimate was based on the Faroese and Danish diet estimated in 1970 and on Danish whole-body measurements.

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